Translation of DE 196 09 252 C1

Component connection and apparatus for its manufacture

The invention relates to a connection between a first component and at least one second component, in particular of adjustment devices for motor vehicles, in accordance with the preamble of claim 1 as well as to a method and an apparatus for manufacturing said connection.

Such a component connection and a method for its manufacture are known, for example, from the German laying-open specification DE 44 17 279 A1. This reference describes a method for the shape-matched connection of two components of adjustment devices for motor vehicles of which one has a tubular section. The tubular section of the first component is guided into an opening of the second component provided for this purpose and a force is then exerted onto the tubular section in an axial direction by which the tubular section is reshaped at least in a part region. The reshaped region of the tubular section of the first component establishes a shape-matched connection to the second component. However, no indications are given in this specification on how the material deformation of the first component can be made such that it also maintains its original shape as much as possible after the reshaping. This is in particular important when the first component should take over functions (e.g. as a support element) which make stringent demands on its design.

A multipart bolt is known from US patent 1,537,521. This bolt can be dismantled and thus allows the establishing of a releasable component connection.

A bush is known from the British patent GB 784,222 which can be fastened in a cut-out of a support element. The bush is made of an elastic

material and has a plurality of axially extending slits in its wall. Due to this resilient design, the bush can be pressed into the opening of the support element, with it being radially compressed. When the bush has reached its end position in the cut-out of the support element, it relaxes, whereby a shape-matched and force-transmitting connection is established between the bush and the support element.

In particular the complex and/or expensive design of the multipart bolt or of the bush provided with slits and made as resilient are disadvantageous in the last-named component connections.

It is the underlying object of the invention to provide a component connection of the initially named kind which can be manufactured in a simple manner and which does not make any special demands on the design of the components to be connected. Furthermore, a method and an apparatus for the manufacture of this component connection should be provided.

This object is satisfied in accordance with the invention with respect to the provision of a component connection by the characterizing portions of claim 1.

The solution in accordance with the invention has the advantage that no special measures are required in the design of the components to be connected to be able to establish the desired component connection. It is only necessary that one of the components to be connected (first component) has a section (fastening section) which can be introduced into a cut-out of the at least one further component (second component). Then a material region is peeled at at least one of the components to be connected which is made of a plastically deformable material and the

peeled region is bent over such that the fastening section of the first component is fastened in the cut-out of the second component or of the second components in a shape-matched and/or force transmitting manner.

In this manner, any desired number of second components can be fastened to the first component. In this respect, the components to be connected remain largely intact since, on the establishing of the component connection, a defined material region is first peeled and subsequently only this material region is deformed.

If the fastening section of the first component engages through the mutually aligned cut-outs of two or more second components, which are connected to one another by the first component, the first component primarily serves as a connection element. The solution in accordance with the invention can, however, also be used to fasten the first component provided with a fastening section to only one second component.

In the component connection in accordance with the invention, the fastening section of the first component is preferably rotationally symmetrical and the cut-out of the second component is circular in cross-section. A symmetrical design of the component connection is thereby made possible so that strains can be absorbed uniformly.

In this respect, the peeled and bent over region can selectively be made of either a contiguous material region or of a plurality of material regions spaced apart from one another.

An advantageous embodiment of the component connection in accordance with the invention is characterized in that the fastening section of the first

component has a shoulder which projects beyond the margin of the cut-out of the second component and contacts a surface of this component and in that the second component is held in a shape-matched manner between the shoulder and a peeled region of the first component. The shape-matched connection can be made such that the second component is clamped between the shoulder and the peeled region of the first component in a force transmitting manner. It is equally conceivable that the second component is fastened movably and in particular rotatably to the first component.

In another possible embodiment, the fastening section of the first component in each case has at its two ends projecting from the cut-out of the at least one second component a peeled region which projects beyond the margin of the cut-out of the second component so that it is held between the two peeled regions in a shape-matched manner.

A further preferred embodiment of the component connection consists of the fastening section of the first component having a groove into which a peeled region of the second component engages. In this respect, the groove is preferably formed by two surfaces which meet one another at an angle and which can be supported at associated support surfaces of the peeled region of the second component.

Provision can be made in order to connect a plurality of second components to one another by the first component that the fastening section of the first component engages through the mutually aligned cut-outs of the second component and that at least one peeled material region of the first component is placed over the margin of the cut-outs of the first component.

Furthermore, a rotatable element can be supported on the fastening section of the first component as a second component and is axially supported, for example, by a peeled region of the first component and by a surface of a further component connected to the first component.

With this kind of fastening, however, the second component can also be supported rotationally fixedly on the first component in that it is clamped between a peeled region of the first component and the surface of the component connected to the first component.

The rotatably supported element can be the cable pulley of a cable window lift which is rotatably connected to a guide rail via a stepped bush.

It is advantageous for the rotatable fastening of a component to the first component if the wall of the cut-out of the rotatable element terminates at an end face with a chamfer with respect to which the peeled region of the fastening section of the first component extends in parallel.

Provision can furthermore be made that a further section is axially adjacent to the fastening section of the first component and that the first component is supported via said further section at a suitable support surface. The further section adjoining the fastening section of the first component can, for example, bridge the distance between the guide rail of a cable window lift and the surface of the associated supporting part (base plate or inner door panel). Axial forces can thus be transmitted to the supporting part.

The first component provided with a fastening section can, for example, be a bolt and in particular a stepped bolt. If this bolt has an axially extending blind bore, additional parts can be fastened thereto by means of a screw

connection or the like. It is equally possible that the stepped bolt is provided with a threaded spigot for the fastening of additional parts.

It is advantageous for a number of applications if the first component provided with a fastening section has a through passage which extends concentrically to the cut-out of the at least one second component.

This is achieved, for example, if the first component is made as a bush and in particular as a stepped bush. It is then possible to fasten the assembly comprising the bush and at least one second component to a part supporting the assembly through the through passage of the bush by a suitable fastening means such a screw or a rivet.

The method in accordance with the invention for the manufacture of the component connection described above is characterized in accordance with claim 20 in that

a) a fastening section of the first component is guided into a cut-out of the at least one second component;
b) a material region of the first component and/or of the second component is peeled by a cutting tool; and
c) the peeled region is bent over by the peeled component toward the respective other component such that the fastening section of the first component forms a shaped-matched connection with the cut-out of the at least one second component.

It must be pointed out that the phrase "a section of the first component is guided into a cut-out of the second component" does not make any statement on which of the components is actually moved. It is only a

question of a relative movement of the components with respect to one another.

Preferred embodiments of the method in accordance with the invention are characterized by the features of claims 21 to 25.

The prime advantage of the method in accordance with the invention is found in the very simple and cost-favorable manufacture of a component connection, with no special demands being made on the design of the components to be connected. Reference is made to the above statements relating to the product in accordance with the invention (component connection) with respect to further advantages.

An apparatus for the manufacture of the component connection in accordance with the invention is characterized by the features of claim 26.

This apparatus includes at least one axially displaceable cutting tool which has a cutting edge at its end face facing the components to be connected, said cutting edge being adjoined by a peeling face extending obliquely to the displacement direction of the cutting tool. A defined material region is cut from the component to be peeled by the end-face cutting edge and is subsequently bent over with the peeling surface such that the desired component connection arises. The design of the peeling surface is fixed by the geometry of the components to be connected.

For the limitation of the peeling depth, the cutting tool in accordance with the invention preferably has an abutment surface which contacts a surface of one of the components to be connected on the reaching of the desired peeling depth.

To ensure a precise axial movement of the cutting tool relative to the components to be connected, the cutting tool can have a guide passage which extends axially and which can receive an end section of one of the components to be connected. The guide passage can also serve the purpose that the cutting tool takes along one of the components to be connected (in particular the first component) on the peeling.

Provision can furthermore be made that the cutting tool has a guide spike at its end facing the components to be connected, the guide spike having an introduction cone arranged in front of the cutting edge which can be introduced into an axial passage of one of the components to be connected. This embodiment is in particular advantageous when the first component is a bush which is provided with a through passage which can receive the guide spike on the peeling.

A peeling device having two cutting tools which are mutually axially displaceable can be used for the simultaneous manufacture of two peeled regions at oppositely disposed ends of the components to be connected.

Further advantages of the invention will become clear in the following description of four embodiments with reference to the Figures.

There are shown:

Fig. 1 - a first embodiment of the invention, with a first component provided with a fastening section being fastened to a second component provided with a cut-out;

Fig. 2 - a further variant of the embodiment in accordance with Fig. 1;

Fig. 3 - an embodiment of the invention, wherein the first component provided with a fastening section serves for the fastening of a rotatable element to a section part;

Fig. 4 - an embodiment of the invention, wherein the first component provided with a fastening section serves for the shaped-matched and form transmitting connection of two further components.

Fig. 1 shows an embodiment of the connection in accordance with the invention between a first component 1 and a second component 6 in longitudinal section (Fig. 1a) and also a view of this component connection (Fig. 1b) from below.

The first component 1 is made as a stepped bush whose front section 11 (fastening section) is inserted into a cut-out 61 of the second component 6 (sheet metal part). In this connection, a shoulder 15 of the stepped bush 1 projects beyond the margin of the cut-out 61 of the metal sheet 6 and contacts its surface 63. The stepped bush 1 moreover has four peeled regions 12 which are spaced apart from one another along their periphery, which are bent over toward the second surface 64 of the sheet metal part 6 and contact it. The sheet metal part 6 is thereby clamped in a shape-matched and force transmitting manner between the shoulder 15 and the peeled regions 12 of the stepped bush 1.

This connection between the bush 1 and the sheet metal part 6 can be manufactured by a single peeling procedure using a corresponding cutting tool. Neither a particularly complex and/or expensive design of the components 1 to 6 to be connected nor additional fastening components are necessary for the manufacture of this connection.

A plurality of peeled regions 12 spaced apart from one another along the periphery of the stepped bush 1 do not necessarily have to be formed for the manufacture of this component connection. It is equally conceivable that the stepped bush 1 is peeled along its total periphery and this peeled region is bent over toward the sheet metal part 6. This variant is indicated in Fig. 1b by the dashed line L.

The stepped bush 1 fastened to the sheet metal part 6 can take over a plurality of further functions. A shaft can thus be supported in its through passage 14, for example. It is equally possible to support a rotatable element such as a cable pulley on the outer wall of the stepped bush 1, see also Fig. 3.

Fig. 2 shows a connection between a bolt-like first component 2 and a second component 7 (sheet metal part) provided with a cut out 71 in longitudinal section.

An end of the bolt 2 provided with a groove 26 is inserted into the guide passage 124 of the cutting tool 120 axially displaceable (along the direction A) for the manufacture of this component connection. The bolt 2 is then introduced into the cut-out 71 of the metal sheet 7 by axial displacement of the cutting tool 120 in the direction of the components to be connected. During the axial displacement of the cutting tool 120, its end-face cutting edge 121 comes into contact with the sheet metal part 7 and infiltrates into it. In this respect, a material region 75 is peeled along the wall of the cut-out 71 of the metal sheet 7 and is bent over inwardly toward the bolt 2 by the obliquely extending peeling surface 122 adjoining the cutting edge 121.The peeled region 75 engages into the groove 26 of the bolt 2 which is formed by the surfaces 27 and 27' extending at an angle of 90° to one another and contact these two surfaces. The fastening

section 21 of the bolt 2 is thereby axially held in both directions in the cut-out 71 of the sheet metal part 7. The components 2 and 7 are therefore connected to one another in a shaped-matched manner. The cutting tool 120 is then removed again by axial displacement along the direction A.

In summary, the embodiments in accordance with Figs. 1 and 2 show that the component connection in accordance with the invention can be manufactured both by the peeling and bending over of a region of the first component provided with a fastening section and by the peeling and bending over of a region of the second component provided with a cut-out.

The use of the component connection in accordance with the invention for the connection of components 3, 8, 10 of a cable window lift is shown in longitudinal section in Fig. 3. Figs. 3a, 3b and 3c also show the method for the manufacture of this component connection.

In the first method step (Fig. 3a), the fastening section 31 of a stepped bush 3 is introduced into the cut-out 81 of the guide rail 8 of a cable window lift. The fastening section 31 terminates with a shoulder 35 which projects beyond the margin of the cut-out 81 of the guide rail 8 and contacts its surface 83. The components 3 and 8 are thus preassembled and can now be connected to one another in a shape-matched manner in a further method step by peeling and bending over of a region of the bush 3.

This second method step is shown in Fig. 3b.

Fig. 3b first shows an embodiment of a cutting tool 130 in accordance with the invention with which the desired component connection can be

manufactured. The cutting tool 130 has a cutting edge 131 at its front end face which is adjoined by a radially outwardly extending peeling surface 132. The cutting edge 131 and the peeling surface 132 can extend along the total periphery of the cutting tool 130. There is alternatively the possibility that a plurality of cutting edges spaced apart from one another with the associated peeling surfaces are arranged along the periphery of the cutting tool 130. Depending on the design of the cutting blade 130, a contiguous peeled material region or a plurality of peeled material regions spaced apart from one another horizontally is/are created.

The cutting tool 130 moreover has at its front end a guide spike 136 which is provided with an introduction cone 137 arranged in front of the cutting edge 131. The guide spike 136 is concentrically surrounded by a guide passage 134 which extends axially up to an abutment surface 133.

To connect the components 3 and 8 shown in Fig. 3a to one another, the cutting tool 130 is displaced axially along the direction B so that the guide spike 136 infiltrates into the through passage 34 of the stepped bush 3. A straight-line axial displacement of the cutting tool 130 is ensured in this respect by the cooperation of the guide spike 136 and the cut-out 34.

As soon as the cutting edge 131 of the cutting tool 130 impacts the step 39 of the stepped bush 3, the peeling procedure begins. A section 32 of the stepped bush 3 is peeled and bent over outwardly toward the surface 84 of the guide rail 8. The peeling procedure is ended when the front end of the stepped bush 3 is incident onto the abutment surface 133 in the guide passage 134 of the cutting tool 130. In accordance with Fig. 3b, the peeled region 32 of the stepped bush 3 then contacts the surface 84 of the guide rail 8 such that it is clamped in a shape-matched and force transmitting manner between the shoulder 35 and the peeled region 32.

The stepped bush 3 and the guide rail 8 are therefore connected to one another in a force transmitting and shape-matched manner. This component connection can be made by a single stroke with the peeling tool 130 directly at the assembly position at which the components 3 and 8 had previously been preassembled (see Fig. 3a). In particular no further fastening elements are required for the manufacture of this component connection. Furthermore, only one peeled region 32 of the stepped region 3 is directly reshaped for the manufacture of the component connection. In other respects, the design of the stepped bush 3 has remained unchanged. Further components can therefore be supported without problem both in its through passage 34 and on its outer wall.

Fig. 3c shows an example for this in longitudinal section, and indeed a cable pulley 10 which is rotatably supported on an axial section 31' of the stepped bush 3 projecting out of the cut-out 81 of the guide rail 8. In accordance with Fig. 3c, the cable pulley 10 arranged on the section 31' of the stepped bolt 3 is axially supported at the surface 83 of the guide rail 8, on the one hand, and at the peeled region 33 of the stepped bush 3, on the other hand. This peeled region 33 extends (with sufficient clearance to enable the rotation of the cable pulley 10) parallel to the chamfer 103 with which the wall of the cut-out 101 of the cable deflection roll 10 terminates at its upper end and serves for the axial support of the cable pulley 10.

The cutting tool 140 is furthermore shown in Fig 3c with which the peeled region 33 of the stepped bush 3 was created. The cutting tool 140 is substantially similar in structure to the cutting tool 130 described above, see Fig. 3b. It has a cutting edge 141 which is adjoined by a radially outwardly extending peeling surface 142. Furthermore, a guide spike 146 having an introduction cone 147 disposed in front of the cutting edge 141

is provided at the front end face of the cutting tool 140. The guide spike 146 is concentrically surrounded by a guide passage 144 which extends axially up to the abutment surface 143.

The peeled region 33 of the stepped bush 3 can be produced with a single stroke of the cutting tool 140. In this connection, the peeling depth of the abutment surface 143 and the peeling angle are determined by the slope of the peeling surface 142.

As can be seen in Fig. 3c, the assembly comprising the guide rail 8, the stepped bush 3 and the cable deflection roll 10 is fastened to a supporting part 110 which can e.g. be a base plate for a door module or an inner door panel. The stepped bush 3 is supported in this respect via the axial section 38 at the surface 112 of the supporting part 110 adjoining the fastening section 31. The distance between the fastening section 31 of the bush 3 and the surface 112 of the supporting part 110 is therefore bridged by the front axial section 38 of the stepped bush 3 so that axial forces can be transmitted from the bush 3 to this part.

The supporting part 110 has a cut-out 111 which is aligned with the through passage 34 of the stepped bush 3. The assembly 3, 8, 10 comprising the stepped bush 3, the guide rail 8 and the cable pulley 10 can be fastened to the supporting part 110 through the aligned cut-outs 34 and 111 by a suitable fastening means such as a screw or a rivet.

Fig. 4 shows an embodiment of the invention in longitudinal section, wherein a bolt 4 serves for the shape-matched and force transmitting connection of two further components 9a and 9b which can, for example, be sheet metal parts. In this component connection, the fastening section 41 of the bolt 4 engages through the mutually aligned cut-outs 91a and

91b of the components 9a and 9b. The bolt 4 has two vertically mutually spaced part peeled regions 42 and 43 which are bent over such that they project beyond the margin of the aligned cut-outs 91a and 91b and contact a respective surface 94b and 93a of the components 9b and 9a to be connected. The two components 9a and 9b are thereby clamped between the peeled regions 42 and 43 and are fastened to one another.

The bolt 4 additionally has a threaded spigot 48 at its front end and a blind bore 49 at its rear end. Still further components can thereby be fastened to the bolt 4. Fig. 4 shows by way of example a further construction element 51 provided with a threaded section and screwed into the blind bore 49.

The bolt 4 ca therefore take over still further tasks in addition to its primary function, namely connecting the components 9a and 9b to one another.

Claims

1. A connection between a first component and at least one second component, in particular of adjustment devices for motor vehicles, wherein a section of the first component (fastening section) engages through a cut-out of the second component and wherein at least one of the two components is made of a plastically deformable material and has a material deformation by means of which the fastening section of the first component is fastened in a shape-matched manner in the cut-out of the second component, characterized in that the material deformation is formed by a peeled region (12; 32, 33, 42, 43; 75) which is provided at the first component (1, 2, 3, 4) and/or at the second component (6, 7, 8, 9a, 9b, 10) and which is bent over by the peeled component (1; 3; 4; 7) toward the respective other component (6; 8, 10; 9a, 9b; 2).

2. A component connection in accordance with claim 1, characterized in that the cut-out (61, 71, 81, 91, 101) of the second component (6, 7, 8, 9, 10) is made circular in cross-section and the fastening section (21, 31, 31', 41) of the first component (2, 3, 4) is made rotationally symmetrical with respect to the longitudinal axis of this cut-out (61, 71, 81, 91, 101).

3. A component connection in accordance with claim 1 or claim 2, characterized in that the peeled region (32, 33, 42, 43) is made of a contiguous material region.

4. A component connection in accordance with claim 1 or claim 2, characterized in that the peeled region (12) is made of a plurality of mutually spaced apart material regions.

5. A component connection in accordance with any one of the preceding claims, characterized in that the fastening section (11, 31) of the first component (1, 3) has a shoulder (15, 35) which projects beyond the margin of the cut-out (61, 81) of the second component (6, 8) and contacts its surface (63, 83); and in that the second component (6, 8) is held in a shape-matched manner between the shoulder (15, 35) and a peeled region (12, 52) of the first component (1, 3).

6. A component connection in accordance with any one of the claims 1 to 4, characterized in that the fastening section (21) of the first component (2) has a groove (26) into which a peeled region (75) of the second component (7) engages.

7. A component connection in accordance with claim 6, characterized in that the grooves (26) are formed by two surfaces (27, 27') which meet one another at an angle and with which a respective parallel support surface of the peeled region (75) of the second component (7) is associated.

8. A component connection in accordance with any one of the preceding claims, characterized in that the fastening section (31, 31'; 41) of the first component (3, 4) engages through the mutually aligned cut-outs (81, 101; 91a, 91b) by a plurality of second components (8, 10; 9a, 9b); and in that a peeled material region (32, 33; 42, 43) of the first component is placed over the margin of the cut-outs (81, 101; 91a, 91b) of the second components (8, 10; 9a, 9b).

9. A component connection in accordance with any one of the preceding claims, characterized in that the second component (10) is rotatably supported on a fastening section (31') of the first component (3); and in that the second component (10) is axially supported by a peeled region (33) of the first component (3) and a surface (83) of a component (8) connected to the first component (3).

10. A component connection in accordance with claim 9, characterized in that the second component (10) is the cable pulley of a cable window lift which is rotatably connected to a guide rail (8) via a stepped bush (3) provided with a peeled region (33).

11. A component connection in accordance with claim 9 or claim 10, characterized in that the wall of the cut-out (101) of the rotatably supported second component (10) terminates at an end face with a chamfer (103) with respect to which the peeled region (33) of the first component (3) extends in parallel.

12. A component connection in accordance with any one of the preceding claims, characterized in that a further section (38) axially adjoins the fastening section (31) of the first component (3) and the first component (3) is supported via it at a contact surface (112) of a supporting part (110).

13. A component connection in accordance with claim 10 and claim 12, characterized in that the further section (38) of the first component (3) bridges the distance (d) between the fastening position of the first component (3) at the guide rail (8) of the cable window lift and the surface (112) of a supporting part (110) at which the guide rail (8) is fastened through cut-outs (34, 111).

14. A component connection in accordance with any one of the preceding claims, characterized in that the first component (1, 3, 4) is made as a bolt, in particular as a stepped bolt.

15. A component connection in accordance with claim 14, characterized in that the first component (4) has an axially extending blind bore (49).

16. A component connection in accordance with claim 14 or claim 15, characterized in that a threaded spigot (489 adjoins the fastening section (41) of the first component (4).

17. A component connection in accordance with any one of the preceding claims, characterized in that the first component (1, 3) has a through passage (14, 34) concentric to the cut-out (61, 81) of the second component (6, 8).

18. A component connection in accordance with any one of the preceding claims, characterized in that the first component (1, 3, 4) is made as a bush, in particular as a stepped bush.

19. A component connection in accordance with claim 17 or claim 18, characterized in that the assembly (3, 8, 10) comprising the first component and at least one second component is fastened by a fastening means to a part (110) supporting the assembly (3, 8, 10) through the through passage (34) of the first component (3).

20. A method for the manufacture of a connection between a first component and at least one second component, in particular of

adjustment devices for motor vehicles, wherein a section of the first component (fastening section) engages through a cut-out of the second component and wherein at least one of the two components is made of a plastically deformable material and has a material deformation by means of which the fastening section of the first component is fastened in a shape-matched manner in the cut-out of the second component, characterized in that

a) a fastening section (11, 21, 31, 31', 41) of the first component (1, 2, 3, 4) is guided into a cut-out (61, 71, 81, 101, 91a, 91b) of the at least one second component (6, 7, 8, 10, 9a, 9b);

b) a material region (12, 32, 33, 42, 43, 75) of the first component (1, 2, 3, 4) and/or of the second component (6, 7, 8, 9a, 9b, 10) is peeled by a cutting tool (120, 130, 140); and

c) the peeled region (12, 32, 33, 42, 43, 75) is bent over by the peeled component (1, 3, 4, 7) toward the respective other component (6, 8, 10, 9a, 9b, 2) such that the fastening section (11, 21, 31, 31', 41) of the first component (1, 2, 3, 4) forms a shape-matched connection with the cut-out (61, 71, 81, 101, 91a, 91b) of the second component (6, 7, 8, 10, 9a, 9b).

21. A method in accordance with claim 20, characterized in that the fastening section (11, 31) of the first component (1, 3) is guided into the cut-out (61, 81) of the second component (6, 8) until a shoulder (15, 35) of the first component (1, 3) contacts a surface (63, 83) of the second component; and in that a region (12, 32) of the first component (1, 3) is peeled by a cutting tool (130) and is bent over toward the second component (6, 8) such that the second component (6, 8) is held in a shape-matched manner between the shoulder (15, 35) and the peeled region (12, 32) of the first component (1, 3).

22. A method in accordance with claim 20 or claim 21, characterized in that a fastening section (31') of the first component (3) is guided into a cut-out (101) of the second component (10) until a surface of the second component (10) contacts a surface (83) of a component (8) connected to the first component (3); and in that a region (33) of the first component (3) is peeled by a cutting tool (140) and is bent over toward the second component (10) such that the second component (10) is held in a shape-matched manner between the component (8) connected to the first component (3) and the peeled region (33).

23. A method in accordance with claim 22, characterized in that a fastening section (31') of a first component (3) connected to a guide rail (8) is guided into a cut-out (101) of a cable pulley (10) until a surface of the cable pulley (10) contacts a contact surface (83) of the guide rail (8); and in that a region (33) of the end of the first component (3) at the cable pulley side is peeled by a cutting tool (140) and is bent over toward the cable pulley (10) such that the cable pulley (10) is held in a shape-matched manner between the guide rail (8) and the peeled region (33).

24. A method in accordance with claim 20, characterized in that the fastening section (21) of the first component (2) having a groove (26) is guided so far into a cut-out (71) of the second component (7) that, after actuation of a cutting tool (120), the region (72) of the second component (7) peeled using the cutting tool (120) engages into the groove (26) of the first component (2).

25. A method in accordance with any one of the claims 20 to 24, characterized in that the first component (2) is guided by the cutting

tool (120) into the cut-out (71) of the second component (7); and in that the first component (2) carries out a synchronous movement with the cutting tool (120) during the peeling procedure.

26. An apparatus for the manufacture of a connection between a first component and at least one second component, in particular of adjustment devices for motor vehicles, wherein a section of the first component (fastening section) engages through a cut-out of the second component and wherein at least one of the two components is made of a plastically deformable material and has a material deformation by means of which the fastening section of the first component is fastened in a shape-matched manner in the cut-out of the second component, characterized by at least one axially displaceable cutting tool (120, 130, 140) which has a cutting edge (121, 131, 141) at its end face facing the components to be connected which is adjoined by a peeling surface (122, 132, 142) extending obliquely to the displacement direction (A, B, C) of the cutting tool (120, 130, 140).

27. An apparatus in accordance with claim 26, characterized in that the cutting tool (130, 140) has an abutment surface (133, 143) by which the peeling depth is bounded.

28. An apparatus in accordance with claim 26 or claim 27, characterized in that the cutting tool (120, 130, 140) has an axially extending guide passage (124, 134, 144) which can receive an end section of one of the components (2, 3) to be connected on the peeling.

29. An apparatus in accordance with any one of the claims 26 to 29, characterized in that the cutting tool (130, 140) has at its end facing the components to be connected a guide spike (136, 146) having an introduction cone (137, 147) arranged in front of the cutting edge (131, 141) which can be introduce into an axial passage (34) of one of the components (3) to be connected.

30. An apparatus in accordance with any one of the claims 26 to 29, characterized by two cutting tools (130, 140) which are mutually axially displaceable.

Abstract

The invention relates to a connection between a first component and at least one second component, in particular of adjustment devices for motor vehicles, wherein a section of the first component (fastening section) engages through a cut-out of the second component and wherein at least one of the two components is made of a plastically deformable material and has a material deformation by means of which the fastening section of the first component is fastened in a shape-matched manner in the cut-out of the second component. In accordance with the invention, the material deformation is formed by a peeled material region (32, 33) which is formed at one (component 3) of the two components (3, 8, 10) which is bent over toward the other component (8, 10).